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10/571,288	03/09/2006	Wolfgang Heeb	016906-0473	8171

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EXAMINER	
D'ANIELLO, NICHOLAS P	
ART UNIT	PAPER NUMBER
1793	
MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/571,288	HEEB ET AL.	
	Examiner	Art Unit	
	Nicholas P. D'Aniello	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendments

The amendment filed May 13th 2008 is acknowledged. Claim 1-15 have been amended, new claims 16-26 have been added, claims 1-26 remain pending in the application. The objection to the specification has been withdrawn as well as the rejection of the claims 3, 5, 7, 12, 13 and 15 under 35 USC § 112.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

- Claim 14 still recites the “the process of claim 1”. There is insufficient antecedent basis for this limitation in the claim. For the purpose of examination this claim is taken to be dependent on claim 10 which is drawn to a process.
- Claim 21 recites the limitation "the shielding gas". There is insufficient antecedent basis for this limitation in the claim. For the purpose of examination this claim is taken to be dependent on claim 14 which recites “a shielding gas”.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2, 4, 5, 8, 16, 18 and 26 rejected under 35 U.S.C. 102(b) as being anticipated by Mori (US Patent No. 5,300,209, of record).

As to **claim 1**, Mori teaches an aluminum based-system alloy where an **aluminum** oxide layer (solder layer) has been formed by anodizing which has a thickness of 300 nm (column 6, lines 51-58). This work piece is intended to be part of a multilayer wiring board and as there are no structural differences between Mori's workpiece and the claimed workpiece (in fact Mori's oxide thickness falls in the preferred ranges of claims 2 and 16), it is the Examiner's position that it is capable of being soldered so that solder is directly applied to the oxide/hydroxide layer. However, it is noted that the claim language does not require solder and/or solder directly applied to the oxide/hydroxide layer.

Regarding **claims 2 and 16**, Mori teaches growing an oxide layer which is 2600 Å (260 nm) thick (column 5, lines 24-26).

Regarding **claims 4 and 18**, Mori discloses that the oxide layer in the aluminum workpiece naturally has a defect density which can be reduced (column 6, lines 28-38). However, one of ordinary skill in the art would appreciate that these defects (inhomogeneities) are still present in the oxide layer. These defects include pinholes (notches, cracks or pores) (column 2, lines 14-26).

Regarding **claim 5**, The Examiner notes that claim 5 is drawn to a product by process. Per MPEP 2113, "[E]ven though product-by-process claims are limited by and defined by the process; determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in

the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) In the instant case, the product set forth in product-by-process claim 5 (as claimed) is the same as that set forth by Mori, above.

In regard to **claim 8**, Mori teach this soldering workpiece to have linear lower electrodes 22 (additional "solder layer", as there is no specific definition for solder layer any layer containing aluminum could be considered this claimed solder layer) of an aluminum alloy (column 6, lines 39-41).

Regarding **independent claim 26**, as for the limitation of "sufficient to" the Examiner notes MPEP 2111.04: "Claim scope is not limited by claim language that suggests or makes optional but does not require steps to be performed, or by claim language that does not limit a claim to a particular structure." Therefore as there are no structural differences between the soldering workpiece of Mori (as described with regard to claim 1) and the claimed workpiece (i.e. an aluminum workpiece with the same oxide thickness performing the function of a soldering workpiece), it is the Examiner's position that the workpiece has an oxide thickness sufficient to provide contact between the solder and soldering workpiece underneath the oxide layer. Mori discloses that the oxide layer in the aluminum workpiece naturally has a defect density which can be reduced (column 6, lines 28-38). However, one of ordinary skill in the art would appreciate that these defects (inhomogeneities) are still present in the oxide layer.

4. Claims 22 and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Werner (US Patent No. 3,844,777).

Regarding **independent claim 22**, Werner discloses a soldering process for joining at least two work pieces to one another comprising: providing a soldering workpiece made from aluminum and/or aluminum compounds, and growing an oxide layer on the surface of the workpiece which is workably thin, meaning sufficient to allow penetration of the filler alloy through the oxide film thereby the desired wetting between the base metal and soldering alloy may occur during a subsequent soldering process. The surfaces are prepared by introducing inhomogeneities into the oxide surface by a cleaning process. The parts are then soldered together in a vacuum atmosphere and allowed to cool in an inert atmosphere. (column 2, lines 20-61). The process of Werner is considered a soldering process in view of applicant's definition of soldering (page 4, last paragraph of instant specification) which defines standard soldering for aluminum as a joining process with temperatures between 500 and 660ºC; where the soldering alloys (referred to as braze alloys in Werner) have a melting temperature between 424 and 615 ºC (see claim 1 of Werner) the process of Werner is consequently considered a soldering process. The cleaning process of Werner creates inhomogeneities in the oxide layer which allows for a capillary effect (drawn in due to the surface tension of cracks and holes) of the soldering alloy into the oxide film (column 1, lines 19-25).

In regard to **claim 25**, Werner teaches the surfaces are prepared with a solution of nitric acid and hydrofluoric acid (fluorine, a halogen containing lubricant). (column 2 lines 39-42).

5. Claims 23 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Werner (US Patent No. 3,844,777). Supporting evidence provided by Orecchia (USP 3,666,869).

As to **claim 23**, Werner teaches the aluminum soldering method as applied above where a *thin oxide film* is formed on the surface of a workpiece. Orecchia teaches that aluminum components form *thin oxide films* up to four tenths a millimeter (400,000 nm) in thickness when exposed to air and elevated temperatures (column 2, lines 40-55). It is therefore reasonably assumed that the oxide film on the workpiece of Werner is at least 25 nm when exposed to air and the ambient temperature of a manufacturing environment.

In regard to **claim 24**, although Werner does not specifically teach the oxide film detaching from the workpiece, the workpiece and process of Werner are structurally and methodically indistinguishable from the claimed method and therefore it is reasonably assumed that at least part of the oxide film will fragment and detach from the workpiece during the soldering step.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 9, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori (US Patent No. 5,300,209) as applied to claim 1 above.

In regard to **claims 9 and 19**, it would have been obvious to one of ordinary skill in the art at the time of the invention to include magnesium because magnesium is a common alloying agent in aluminum such as the entire 5XXX series of aluminum alloys which contain magnesium. The low magnesium alloys (.5 to 1.5 wt%) having the best formability.

Regarding **claim 17**, Mori teaches growing an oxide layer which is 2600 Å (260 nm) thick (column 5, lines 24-26). The following is a section from the MPEP 2144.05 concerning the obviousness of ranges: In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). Similarly, a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). In the instant case an oxide layer of 260 nm is close enough (to 250 nm) that one of ordinary skill in the art would expect them to have the same properties. Where the methods of measuring thickness and variations in thickness across the entire workpiece are prominent variables which can give different results, these ranges are taken to be embraced by Mori.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mori (US Patent No. 5,300,209) as applied to claim 1 above, and further in view of McMillan et al. (US Patent No. 3,986,897, of record).

Mori teaches a soldering work piece with an oxide layer thicker then the native oxide layer as applied to claim 1. **Claim 3** differs from the reference in calling for the oxide/hydroxide layer to be predominantly boehmite. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the aluminum oxide layer in a hydrated boehmite form because McMillan et al., also drawn to passivated aluminum substrates, discloses the treatment of aluminum by converting aluminum oxide to boehmite in order to achieve an aluminum substrate with a smoother less hillocked surface which also avoids pitting, electro-migration and has improved thermal properties (column 1, lines 43-50 and column 2, lines 52-62).

9. Claims 6, 7, 10-15 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori (US Patent No. 5,300,209) as applied to claim 1 above, and further in view of Swaney (US Patent No. 3,747,199, of record).

Mori teaches a soldering work piece with an oxide layer thicker then the native oxide layer as applied to claim 1. **Claims 6 and 7** differ from the reference in calling for a particular lubricant. However, it would have been obvious in the art to provide the soldering work piece with a lubricant because Swaney teaches a method of brazing (soldering) aluminum articles which have been provided with a petroleum based lubricant, Cindol 3401, which is reasonably expected to contain bromide (halogen) and

sulfur compounds which provides for successful brazing of the components (column 2, lines 23-27).

In regard to **claims 10 and 21**, it would have been obvious in the art to join two work pieces with at least with an oxide layer thicker than the 25 nm because (A) Mori et al. teach anodizing aluminum to have a thicker oxide layer and (B) Swaney teaches a method of successfully vacuum brazing aluminum articles as applied above where the workpiece has been cold worked by a pressing (punching) operation (column 1, lines 36-48).

In regard to **claims 11 and 12**, it would have been obvious to apply a lubricant as applied to claims 6 and 7 above.

In regard to **claim 13**, it would have been obvious in the art that the thermal degreasing and soldering would be carried out together because Swaney teaches a single heating operation where the lubricants are volatilized (evaporated, thermal degreasing) and then the temperature is increased to effectuate the braze (column 2, lines 28-47).

In regard to **claims 14 and 21**, it would have been obvious in the art to employ a shielding gas because (A) Swaney teaches vacuum brazing (column 1, lines 58-62) and (B) inert (shielding) gasses and vacuum processing are art recognized alternatives. Additionally, argon, hydrogen and nitrogen are all well known shielding gasses.

In regard to **claim 15**, Swaney teaches an example of his invention is for the fabrication of a typical aluminum brazed heat exchanger (column 1, lines 36-44).

10. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Werner (US Patent No. 3,844,777) as applied to claim 22 above, and further in view of Orecchia (USP 3,666,869).

Werner teaches the aluminum soldering method as applied above where a *thin oxide film* is formed on the surface of a workpiece. If it is not taken that Werner teaches an oxide layer greater than 25 nm, **claim 23** differs from the reference in calling for the aluminum oxide layer to be 25 nm or greater where the reference is silent regarding the thickness. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to have the oxide thickness be at least 25 nm because Orecchia teaches that aluminum components form *thin oxide films* up to four tenths a millimeter (400,000 nm) in thickness when exposed to air and elevated temperatures (column 2, lines 40-55) and such a thickness naturally passivates the surface of the workpiece.

In regard to **claim 24**, although Werner does not specifically teach the oxide film detaching from the workpiece, the workpiece and process of Werner are structurally and methodically indistinguishable from the claimed method and therefore it is reasonably assumed that at least part of the oxide film will fragment and detach from the workpiece during the soldering step.

Response to Arguments

Applicant's arguments filed May 13th 2008 have been fully considered but they are not persuasive. Although solder is not directly applied to the oxide layer in the soldering workpiece of Mori, this claim only requires a soldering workpiece which is

“configured to be soldered so that solder is directly applied to the oxide and/or hydroxide layer" and does not positively require solder to be applied directly to the oxide/hydroxide layer. Therefore because there are no structural differences between Mori’s workpiece and the claimed workpiece (in fact Mori’s oxide thickness falls in the preferred ranges of claims 2 and 16), it is the Examiner's position that it is capable of being soldered so that solder is directly applied to the oxide/hydroxide layer. However, as noted above, the claim language does not require solder and/or solder directly applied to the oxide/hydroxide layer.

9. Similarly, the language in independent claim 26 (i.e. “sufficient to”) does not limit the scope of the claim, and as the soldering workpiece of Mori is structurally indistinguishable from the claimed workpiece, it is the Examiner's position that the workpiece of Mori has an oxide layer sufficiently thick to provide contact between the solder and the workpiece underneath the oxide layer during soldering.

10. The combination of Mori and McMillan et al. has been withdrawn with regard to forming the inhomogeneities (defects). As noted above, Mori discloses that the oxide layer in the aluminum workpiece naturally has a defect density which can be reduced (column 6, lines 28-38). However, one of ordinary skill in the art would appreciate that these defects (inhomogeneities) are still present in the oxide layer. These defects include pinholes (notches, cracks or pores) (column 2, lines 14-26). Therefore the claims regarding introducing inhomogeneities to the oxide layer is seen as taught by Mori because the oxide layer naturally has unavoidable defects.

11. In regard to counsel's argument against the combination of Mori and Swaney, Jr., although brazing is normally effected at higher temperatures than soldering, the use of aluminum restricts the temperature of process (aluminum's melting temperature is only 660ºC) and therefore the brazing must be done at a relatively low temperature and as described on page 4 in the final paragraph of the instant specification, standard soldering occurs between 500 and 660ºC, which is the same temperature range as the brazing process.

12. The Examiner has taken the position that aluminum alloys with magnesium content between 0.2 and 2% are well known such as the 5xxx series of aluminum alloys which are commonly used in industry for the their desired properties (such as low cost and weight, and relatively high strength).

13. The Examiner has also taken the position that inert gas soldering and vacuum soldering are art recognized alternatives and that argon, hydrogen or nitrogen are well known shielding gasses. For example, these assertions are exemplified in the teachings of Knepper et al. (USP 5,618,357) who teach the joining of aluminum components by a soldering process which can take place in an inert/protective gas atmosphere or in a vacuum (column 1 lines 35-40) where an inert/protective gas such as argon is used (column 3, lines 34-37).

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicholas P. D'Aniello whose telephone number is (571)270-3635. The examiner can normally be reached on Monday through Thursday from 8am to 5pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on (571) 272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. P. D./
Examiner, Art Unit 1793
7/10/2008

/Jessica L. Ward/
Supervisory Patent Examiner, Art Unit 1793